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EXAMINER

CHUO, TONY SHENG HSIANG

ART UNIT PAPER NUMBER

1745

DATE MAILED: 08/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/686,480

Applicant(s)

NISHIMURA ET AL.

Examiner

Tony Chuo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-13 and 16-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-13 and 16-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/14/06.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 2-13 and 16-23 are currently pending in this application. Claims 1, 14 and 15 have been cancelled. New claims 18-23 have been added. The objection to the drawing is withdrawn. The previous objections to the specification are withdrawn. However, the specification is currently objected under the following new objection. The 35 USC 112 rejections for claims 1, 3, 4, 7, 12, and 17 are withdrawn. Claims 2-13 and 16-23 are currently rejected under the following new 103 rejections. This action is made FINAL as necessitated by the amendments.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 6/14/06 was filed on 6/14/06. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 17, 18, 22, and 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably

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convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification discloses that the humidifier "108" is provided next to the anode gas flow channels to humidify the gas on page 8 lines 15-18, but it does not disclose humidifying the oxidizing gas fed to the cathode.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 17 recites the limitation "the flow channels" in line 6. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 22 recites the limitation "said humidifier" in line 2-3. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 23 recites the limitation "said humidifier" in line 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2-4, 8, 10, 11, 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawazu (JP 08-138704) in view of Nakao et al (US 4909810). The Kawazu reference teaches a fuel cell assembly "100" including at least one unit fuel cell

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"10" comprising a separator "14" having flow channels for oxidizing gas, a cathode "12" to which the oxidizing gas is fed, a membrane electrolyte "11", an anode "13" to which fuel gas is fed, and a separator "15" having flow channels for the fuel gas (See Drawing 2). The fuel cell assembly further comprises a humidifier "110" having a porous membrane "111" to humidify the fuel gas to be fed to anode where the porous membrane faces the flow channels for the fuel gas so that water is supplied to flow channels from the part of the opposed surface of the porous membrane (See Drawing 3). It also teaches a porous membrane that is made of a hydrophilic polymer material (See paragraph [0037]). It also teaches a water permeable membrane having the function to transmit water that is formed on porous material (See Drawing 3). It also teaches a humidifier that has a porous carbon filter "608" that is capable of controlling the flow rate of water to the porous membrane (See Drawing 5 and paragraph [0062]). It also teaches a humidifier that is provided for a group of unit cells (See Drawing 1). It also teaches a power generation system "1" comprising a hydrogen gas storage tub and a fuel cell assembly "100" connected to the hydrogen gas storage tub with a piping through which fuel gas flows where the fuel cell assembly generates electricity using the fuel gas from the hydrogen gas storage tub (See Drawing 1 and paragraph [0044]). However, the reference does not expressly teach a water retaining layer that is polypropylene non-woven cloth and has a mean micro-pore diameter of 10 to 300 μm and a thickness of 50 to 300 μm . The Nakao reference teaches a vapor permselective membrane comprising a membrane laminated with a hydrophilic porous material that is a polypropylene non-woven fabric and has a pore diameter of 0.1 to 100 μm and a

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thickness of 50 to 500 μm (See column 7, lines 31-40 and 60-61 and column 8, lines 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawazu fuel cell assembly to include a water retaining layer that is polypropylene non-woven cloth and has a mean micro-pore diameter of 10 to 300 μm and a thickness of 50 to 300 μm in order to provide a membrane with a high water vapor permeation rate and high separation factor of water vapor which would increase the efficiency of the humidifier to humidify the anode gas. Regarding claim 3, the references do not expressly teach the thickness of a humidifying water inlet of humidifier that is $\frac{1}{2}$ to $\frac{3}{4}$ the thickness of the porous member. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawazu fuel cell assembly so that the thickness of a humidifying water inlet of humidifier that is $\frac{1}{2}$ to $\frac{3}{4}$ the thickness of the porous member because changes in proportion were held to be obvious (See *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984)).

Examiner's note: Generally, differences in ranges will not support patentability of subject matter encompassed by the prior art unless there is evidence indicating such range is critical. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)). Further, Nakao reference is relevant because the membrane disclosed is capable of being used for the production of a moisture controlled gas useful in a wide range of fields including chemical industries, electric and electronic industry, etc (See column 1, lines 15-18).

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11. Claims 12, 13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karakane et al (JP 2000-173633) in view of Nakao et al (US 4909810). The Karakane reference teaches a fuel cell assembly that includes a unit cell "100" comprising a cathode "22", anode "23", membrane electrolyte "21", and a humidifier "40" that is equipped with a water retaining layer "402" (See Drawing 1 and paragraph [0014]). Further, it also teaches the water retaining layer that has a hydrophilic porous member (See Drawing 2 and paragraph [0025]). In addition, it teaches a water retaining layer which is provided to the flow channels "400" of the fuel gas and has one surface to supply water to flow channels where water is supplied from the outer edge of the water retaining layer (See Drawing 1). However, the reference does not expressly teach a water retaining layer that has a mean micro-pore diameter of 10 to 300 μm and a thickness of 50 to 300 μm . The Nakao reference teaches a vapor permselective membrane comprising hydrophilic porous material that has a pore diameter of 0.1 to 100 μm and a thickness of 50 to 500 μm (See column 7, lines 31-40 and 60-61 and column 8, line 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Karakane fuel cell assembly to include a water retaining layer that has a mean micro-pore diameter of 10 to 300 μm and a thickness of 50 to 300 μm in order to provide a membrane with a high water vapor permeation rate and high separation factor of water vapor which would increase the efficiency of the humidifier to humidify the anode gas.

Examiner's note: Generally, differences in composition will not support patentability of subject matter encompassed by the prior art unless there is evidence indicating such

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composition is critical. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)). Further, Nakao reference is relevant because the membrane disclosed is capable of being used for the production of a moisture controlled gas useful in a wide range of fields including chemical industries, electric and electronic industry, etc (See column 1, lines 15-18).

12. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawazu (JP 08-138704) in view of Nakao et al (US 4909810) as applied to claim 4 above, and further in view of Mossman (US 2001/0046616). However, the references do not expressly teach a water permeable membrane that has a mean pore diameter of 0.01 to 0.1 micrometer, a thickness of 10 to 100 micrometer, and a porosity of 50-90%. It also does not expressly teach a membrane treated to be hydrophilic and selected from polytetrafluoroethylene, polystyrene and copolymer of styrene and butadiene. The Mossman reference does teach a water permeable membrane, Nafion, that is a polytetrafluoroethylene membrane treated to be hydrophilic and has an average pore size between 0.025 to 0.1 micrometer, a porosity of greater than 50%, and a thickness of 89 micrometer (See paragraph [0016] and Dupont Nafion PFSA Membranes Specs). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawazu-Nakao fuel cell assembly to include a water permeable membrane that is a polytetrafluoroethylene membrane treated to be hydrophilic and has an average pore size between 0.025 to 0.1 micrometer, a porosity

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of greater than 50%, and a thickness of 89 micrometer because it is effective in adequately humidifying a reactant gas in a fuel cell.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawazu (JP 08-138704) in view of Nakao et al (US 4909810) as applied to claim 18 above, and further in view of Kawazu (JP 08-138705). However, the references do not expressly teach a porous member that has a hydrogen oxidizing catalyst dispersed therein. The Kawazu(05) reference does teach a hydrogen oxidizing catalyst "22" that is dispersed on the porous film "21" (See Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawazu(04) fuel cell assembly to include a hydrogen oxidizing catalyst that is dispersed on the porous water permeable membrane so that a drop in the power generating capability of the fuel cell can be prevented by stopping the hydrogen gas from passing through the porous membrane.

14. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karakane et al (JP 2000-173633) in view of Nakao et al (US 4909810) as applied to claim 12, and further in view of Kawazu (JP 08-138704). However, the references do not expressly teach a water retaining layer that has a porous member which is provided opposite to the unit cell and has a water supplying surface where water is supplied from part of the surface opposite to the water supplying surface of the porous member. The Kawazu reference does teach a porous membrane that is provided opposite to the unit cell and has a water supplying surface (See Drawing 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify

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the Karakane-Nakao fuel cell to include a porous membrane that is provided opposite to the unit cell and has a water supplying surface where the water is supplied from part of a surface opposite to the water supplying surface of the porous membrane in order to prevent water droplets and produce a good steam condition.

Response to Arguments

15. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC



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